Biomass for industry: German strategies for the 21st century

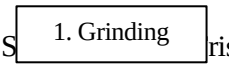
B. Schmidt*, E. Langer
C.A.R.M.E.N. (**C**entral **A**gricultural **R**aw **M**aterial and D**E**velopment **N**etwork)
Schulgasse 18, 94315 Straubing, Bavaria, Germany
Fax: 09421-960-333; bs@carmen-ev.de

Around 12,000,000 ha of Germany are covered with cropland, the share of non-food crops having risen from 2.5% in 1993 to 6.3% in 1999 (760,000 ha respectively). The most important renewable raw material is rapeseed oil (54%), followed by linseed oil (24%), starch (16%) and sunflower oil (3%). To support the energetic as well as the industrial use of biomass, the German and many federal states' governments provide all in all more than 40,000,000 EURO per year. Concerning the industrial use, the focus is on supporting the following topics: (1) R&D on new production technologies for new raw materials, (2) R&D on new products and (3) the installation of production facilities. To coordinate the biomass activities in Germany several agencies have been founded since, C.A.R.M.E.N. being the one responsible for Bavaria, the largest federal state of Germany.[1]

Production technologies: Friolex®, the road to new high-quality oils

The enterprise Dr. Frische GmbH at Alzenau developed a new process for producing native oils and fats in cooperation with a worldwide operating manufacturer of centrifuges. The installation of a pilot plant with a capacity of 10,000 to oil seeds per year was subsidized by the Bavarian Ministry of Agriculture. Friolex® is based on a centrifugal separation process and characterized by high-yields, gentle processing and broad applicabability. Therefore, it is suited for the production of high-quality oils. Fig. 1 shows the production steps of the Friolex® process.[2]

Figure 1. Production steps of the Friolex® process



S rische GmbH has been offering an out-standing product that is gained by the Friolex® process: *90plus*, a high-oleic sunflower oil with more than 90% oleic acid, less than 3% linoleic acid and less than 2% steareic acid. Furthermore, its content of free fatty acid is below 0.1%. Because of its special composition *90plus* has very attractive properties: high oxidative stability and improved high and low temperature behavior. Thus, it can be favorably used for high performance applications such as cosmetic products, lubricants or starting materials for chemical synthesis.

Products: PTP®, a high-tech material for the car industry

There is a great diversity of new nature-based materials. A very new and promising material is PTP®, developed by the young German company Preform Bio-Composites at Feuchtwangen. It is a Polymer based on Triglycerides and Polycarboxylic acid anhydrides. Its synthesis and chemical structure is schematically shown in fig. 2.[3]

PTP® behaves as a duromer and has properties comparable to conventional epoxy resins. Being processed with natural fibres such as flax or hemp very hardwearing and sturdy shape parts can be manufactured, e. g. for interior linings of cars, trains or for furniture. PTP® biocomposites have out-standing mechanical properties, e. g. high tensile strength and excellent modulus of elasticity.

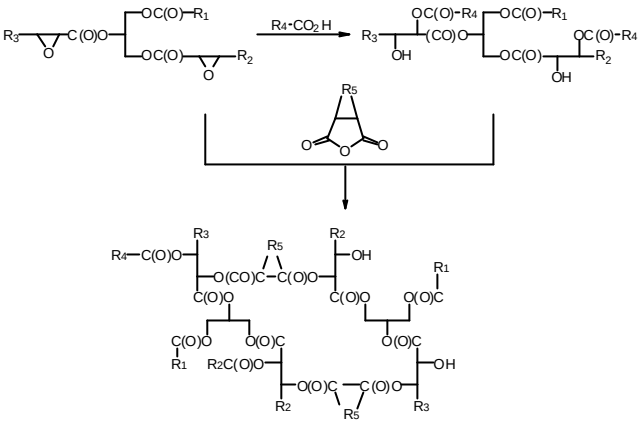


Figure 2. PTP®'s synthesis and chemical structure [3]

Since 1995, R&D has been performed in cooperation with BMW AG at Munich. There were such good results that at the beginning of the year 2000 a test series of interior linings for the Model 5 was launched. The next step will be to build up a pilot plant in which the synthesis of a nature based carboxylic acid anhydride is realized. This project is going to be subsidized by the Bavarian Ministry of Agriculture.

Production facilities: Mattresses based on native oils

During a two years' periode of R&D work, the company Metzeler at Memmingen, a world renown manufacturer of high-tech foams, developed a new flexible PU foam for mattresses. In contrast to conventional PU mattresses, the polyol component used isn't made from mineral oil but is based on sunflower oil. The new mattress *Rubex NAWARO* is medically tested and possesses extraordinary properties, e. g. high lying comfort and excellent breathability. *Rubex NAWARO* was introduced to the public in January 2001. The production of about 60,000 mattresses per year is starting in June 2001 and will be also subsidized by the Bavarian Ministry of Agriculture.[4]

Conclusion

The examples above were ment to show some of the measures taken in Germany to increase the use of renewable raw materials in industry. However, there are more points the focus should be set on in the future. They can be resumed as follows:

?? more carefully directed financial support of (practice-oriented) R&D
?? subsidies on the cultivation of new crops that better meet the needs of industry
?? investment subsidies for the installation of production facilities of promising product lines
?? measures for developing the markets, for stimulating and creating a demand, e. g. User experiments
?? taxation measures, e. g. eco-tax on mineral oil or CO_2 emissions
?? legal measures, e. g. prohibition of mineral oil-based lubricants in ecologically sensitive areas
?? publicity measures, consumer fairs, congresses and publications for experts, politicians and users.

References

[1] www.inaro.de/Deutsch/d_index.htm.
[2] Dr. Frische GmbH, company information.
[3] Behage J. H, Green-Tech Newsletter 2, 1999, p. 8.
[4] C.A.R.M.E.N., own information.